SEQUENCE LISTING

<110> YOKOYAMA, Keiichi
ONO, Kunio
EJIMA, Daisuke

<120> PROCESS FOR PRODUCING TRANSGLUTAMINASE

<130> 209524US0CONT

<170> PatentIn version 3.1

<210> 1

√160> 58

<211> 1519

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic DNA

<220>

<221> CDS

<222> (87)..(1082)

<223>

<400> ttcccctgtt gacaattaat catcgaacta gttaactagt acgcaagttc acgtaaaaag 60 ggtatcgatt agtaaggagg tttaaa atg gat tct gac gat cgt gtt act cca 113 Met Asp Ser Asp Asp Arg Val Thr Pro cca gct gaa cca ctg gat cgt atg cca gat cca tat cgt cca tct tat 161 Pro Ala Glu Pro Leu Asp Arg Met Pro Asp Pro Tyr Arg Pro Ser Tyr 1.0 15 25 ggt cgt gct gaa act gtt gtt aat aat tat att cgt aaa tgg caa caa 209 GLy Arg Ala Glu Thr Val Val Asn Asn Tyr Ile Arg Lys Trp Gln Gln git tat tot cat cgt gat ggt cgt aaa caa caa atg act gaa gaa caa 257 Val Tyr Ser His Arg Asp Gly Arg Lys Gln Gln Met Thr Glu Glu Gln 45 dot gaa tgg ctg tct tat ggt tgc gtt ggt gtt act tgg gtt aac tct 305 Arg Glu Trp Leu Ser Tyr Gly Cys Val Gly Val Thr Trp Val Asn Ser ij 60 gigt cag tat ccg act aac cgt ctg gca ttc gct tcc ttc gat gaa gat 353 Gly Gln Tyr Pro Thr Asn Arg Leu Ala Phe Ala Ser Phe Asp Glu Asp cgt ttc aag aac gaa ctg aag aac ggt cgt ccg cgt tct ggt gaa act 401 Arg Phe Lys Asn Glu Leu Lys Asn Gly Arg Pro Arg Ser Gly Glu Thr 90 100 105 cgt gct gaa ttc gaa ggt cgt gtt gct aag gaa tcc ttc gat gaa gag 449 Arg Ala Glu Phe Glu Gly Arg Val Ala Lys Glu Ser Phe Asp Glu Glu 110 120 aaa ggc ttc cag cgt gct cgt gaa gtt gct tct gtt atg aac cgt gct 497 Lys Gly Phe Gln Arg Ala Arg Glu Val Ala Ser Val Met Asn Arg Ala 125 130 135 cta gag aac gct cat gat gaa tct gct tac ctg gat aac ctg aag aag 545 Leu Glu Asn Ala His Asp Glu Ser Ala Tyr Leu Asp Asn Leu Lys Lys 140 145

gaa Glu	ctg Leu 155	gct Ala	aac Asn	ggt Gly	aac Asn	gat Asp 160	gct Ala	ctg Leu	cgt Arg	aac Asn	gaa Glu 165	gat Asp	gct Ala	cgt Arg	tct Ser	593
ccg Pro 170	ttc Phe	tac Tyr	tct Ser	gct Ala	ctg Leu 175	cgt Arg	aac Asn	act Thr	ccg Pro	tcc Ser 180	ttc Phe	aaa Lys	gaa Glu	cgt Arg	aac Asn 185	641
ggt Gly	ggt Gly	aac Asn	cat His	gat Asp 190	ccg Pro	tct Ser	cgt Arg	atg Met	aaa Lys 195	gct Ala	gtt Val	atc Ile	tac Tyr	tct Ser 200	aaa Lys	689
cat His	ttc Phe	tgg Trp	tct Ser 205	ggt Gly	cag Gln	gat Asp	aga Arg	tct Ser 210	tct Ser	tct Ser	gct Ala	gat Asp	aaa Lys 215	cgt Arg	aaa Lys	737
Ťyr •	ggt Gly	gat Asp 220	ccg Pro	gat Asp	gca Ala	ttc Phe	cgt Arg 225	ccg Pro	gct Ala	ccg Pro	ggt Gly	act Thr 230	ggt Gly	ctg Leu	gta Val	785
gac Asp	atg Met 235	tct Ser	cgt Arg	gat Asp	cgt Arg	aac Asn 240	atc Ile	ccg Pro	cgt Arg	tct Ser	ccg Pro 245	act Thr	tct Ser	ccg Pro	ggt Gly	833
qaa	ggc Gly	ttc Phe	gtt Val	aac Asn	ttc Phe 255	gat Asp	tac Tyr	ggt Gly	tgg Trp	ttc Phe 260	ggt Gly	gct Ala	cag Gln	act Thr	gaa Glu 265	881
det	gat Asp	gct Ala	gat Asp	aag Lys 270	act Thr	gta Val	tgg Trp	acc Thr	cat His 275	ggt Gly	aac Asn	cat His	tac Tyr	cat His 280	gct Ala	929
deg	aac Asn	ggt Gly	tct Ser 285	ctg Leu	ggt Gly	gct Ala	atg Met	cat His 290	gta Val	tac Tyr	gaa Glu	tct Ser	aaa Lys 295	ttc Phe	cgt Arg	977
aac Asn	tgg Trp	tct Ser 300	gaa Glu	ggt Gly	tac Tyr	tct Ser	gac Asp 305	ttc Phe	gat Asp	cgt Arg	ggt Gly	gct Ala 310	tac Tyr	gtt Val	atc Ile	1025
acc Thr	ttc Phe 315	att Ile	ccg Pro	aaa Lys	tct Ser	tgg Trp 320	aac Asn	act Thr	gct Ala	ccg Pro	gac Asp 325	aaa Lys	gtt Val	aaa Lys	cag Gln	1073
	tgg Trp			tgaa	agc	ttgg	atct	ct a	atta	ctgg	a ct	tcac	acag			1122
act	aaaa	tag	acat	atct	ta t	atta	tgtg	a tt	ttgt	gaca	ttt	ccta	gat	gtga	ggtgga	1182
ggt	gatg	tat	aagg	taga	tg a	tgat	cctc	t ac	gccg	gacg	cat	cgtg	gcc	ggca	tcaccg	1242

gegecacagg tgeggttget ggegectata tegeogacat cacegatggg gaagateggg 1302
ctegecactt egggeteatg agegettgtt teggegtggg tatggtggea ggeecegtgg 1362
cegggggact gttgggegee ateteettge atgeaceatt cettgeggeg geggtgetea 1422
aeggeeteaa cetactactg ggetgettee taatgeagga gtegeataag ggagagegte 1482
gagageeege etaatgageg ggetttttt teagetg 1519

<210> 2

<211> 332

<212> PRT

<213> Artificial Sequence

[] (] (**22**0>

141

<223> Synthetic DNA

<400> 2

Met Asp Ser Asp Asp Arg Val Thr Pro Pro Ala Glu Pro Leu Asp Arg

Met Pro Asp Pro Tyr Arg Pro Ser Tyr Gly Arg Ala Glu Thr Val Val 20 25 30

Asn Asn Tyr Ile Arg Lys Trp Gln Gln Val Tyr Ser His Arg Asp Gly 35 40 45

Arg Lys Gln Gln Met Thr Glu Glu Gln Arg Glu Trp Leu Ser Tyr Gly 50 55 60

Cys Val Gly Val Thr Trp Val Asn Ser Gly Gln Tyr Pro Thr Asn Arg 70 75 80

Leu Ala Phe Ala Ser Phe Asp Glu Asp Arg Phe Lys Asn Glu Leu Lys 85 90 95

Asn Gly Arg Pro Arg Ser Gly Glu Thr Arg Ala Glu Phe Glu Gly Arg

- Val Ala Lys Glu Ser Phe Asp Glu Glu Lys Gly Phe Gln Arg Ala Arg Glu Val Ala Ser Val Met Asn Arg Ala Leu Glu Asn Ala His Asp Glu Ser Ala Tyr Leu Asp Asn Leu Lys Lys Glu Leu Ala Asn Gly Asn Asp Ala Leu Arg Asn Glu Asp Ala Arg Ser Pro Phe Tyr Ser Ala Leu Arg Asn Thr Pro Ser Phe Lys Glu Arg Asn Gly Gly Asn His Asp Pro Ser Arg Met Lys Ala Val Ile Tyr Ser Lys His Phe Trp Ser Gly Gln Asp s dara Arg Ser Ser Ser Ala Asp Lys Arg Lys Tyr Gly Asp Pro Asp Ala Phe m Arg Pro Ala Pro Gly Thr Gly Leu Val Asp Met Ser Arg Asp Arg Asn Ile Pro Arg Ser Pro Thr Ser Pro Gly Glu Gly Phe Val Asn Phe Asp Tyr Gly Trp Phe Gly Ala Gln Thr Glu Ala Asp Ala Asp Lys Thr Val Trp Thr His Gly Asn His Tyr His Ala Pro Asn Gly Ser Leu Gly Ala Met His Val Tyr Glu Ser Lys Phe Arg Asn Trp Ser Glu Gly Tyr Ser
- Asp Phe Asp Arg Gly Ala Tyr Val Ile Thr Phe Ile Pro Lys Ser Trp

310

315

320

39

41

Asn Thr Ala Pro Asp Lys Val Lys Gln Gly Trp Pro 325 330

<210> 3

<211> 39

<212> DNA

<213> Artificial Sequence

₹220>

<223> Synthetic DNA

<400>

aattcatcga ttagtaagga ggtttaaaat ggattctga

<210>

<211> 41

<212> DNA

<213> Artificial Sequence

i aris

<220>

<223> Synthetic DNA

<400>

cgatcgtcag aatccatttt aaacctcctt actaatcgat g

<210> 5

<211> 41

<212> DNA

```
<220>
<223> Synthetic DNA
<400>
                                                                       41
cgatcgtgtt actccaccag ctgaaccact ggatcgtatg c
<210>
       6
<211>
       41
<212>
      DNA
<213> Artificial Sequence
<220>
<223> Synthetic DNA
<400>
                                                                       41
gatctggcat acgatccagt ggttcagctg gtggagtaac a
<210>
      7
211>
      41
      DNA
       Artificial Sequence
<220>
<223> Synthetic DNA
<400>
       7
                                                                        41
cagatccata tcgtccatct tatggtcgtg ctgaaactgt t
<210>
       8
<211>
       41
<212> DNA
```

```
<220>
       Synthetic DNA
<223>
<400>
                                                                        41
attaacaaca gtttcagcac gaccataaga tggacgatat g
<210>
       9
       41
<211>
<212>
      DNA
<213> Artificial Sequence
<220>
<223> Synthetic DNA
<400>
gttaataatt atattcgtaa atggcaacaa gtttattctc a
                                                                         41
<u></u>210>
       10
11>
       41
       DNA
<213>
       Artificial Sequence
<220>
<223>
       Synthetic DNA
       10
<400>
                                                                         41
tcacgatgag aataaacttg ttgccattta cgaatataat t
       11
 <210>
 <211>
        41
 <212> DNA
 <213> Artificial Sequence
```

<220>		
<223>	Synthetic DNA	
<400> tcgtga	11 tggt cgtaaacaac aaatgactga agaacaacgt g	41
<210>	12	
<211>	41	
<212>	DNA	
<213>	Artificial Sequence	
20> 23> 23> 23> 23> 10> 10>	Synthetic DNA 12 cacg ttgttcttca gtcatttgtt gtttacgacc a 13	41
11>	42	
<u>₹</u> 212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	
<400> aatggc	13 tgtc ttatggttgc gttggtgtta cttgggttaa ca	42
<210>	14	
<211>	40	

<212>

DNA

<220>		
<223>	Synthetic DNA	
<400> agcttg	14 ttaa cccaagtaac accaacgcaa ccataagaca	40
<210>	15	
<211>	38	
<212>	DNA	
<213> 	Artificial Sequence Synthetic DNA	
₹223>	Synthetic DNA	
<400>	15	
aattcg	ttaa ctctggtcag tatccgacta accgtctg	38
210>	16	
2 211>	41	
<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	
<400> cgaatg	16 ccag acggttagtc ggatactgac cagagttaac g	41
<210>	17	

<211> 49

<Ž12>	DNA	
<213>	Artificial Sequence	
<220>		
	Synthetic DNA	
<400> gcattc	17 gctt ccttcgatga agatcgtttc aagaacgaac tgaagaacg	49
<210>	18	
<211>	49	
-		
<-212>	DNA	
◆2 13>	DNA Artificial Sequence	
200 M		
220>		
223>	Synthetic DNA	
<u><</u> 400>	18	4.0
ggacga M	ccgt tcttcagttc gttcttgaaa cgatcttcat cgaaggaag 19	49
2 210>	19	
· <211>		
<212>	DNA	
	Artificial Sequence	
(210)	Melitotat bequence	
4000		
<220>		
	Synthetic DNA	
<400> atcatc	19 cgcg ttctggtgaa actcgtgctg aattc	35
99-0	٠ ١٠ ١٠ ١٠ ١٠ ١٠ ١٠ ١٠-	-
<210>	20	

<211>	35	
<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	
<400> gacctt	20 cgaa ttcagcacga gtttcaccag aacgc	35
<210>	21	
<-211>	48	
第12>	DNA	
加 万 之 2220>	Artificial Sequence	
223>	Synthetic DNA	
¶ ≰400> gaaggt	21 cgtg ttgctaagga atccttcgat gaagagaaag gcttccag	48
<210>	22	
<211>	48	
<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	
<400> gagca	22 cgctg gaagcctttc tcttcatcga aggattcctt agcaacac	4

```
<210> 23
<211>
      42
<212>
      DNA
<213> Artificial Sequence
<220>
<223>
      Synthetic DNA
<400>
       23
                                                                       42
cgtgctcgtg aagttgcttc tgttatgaac cgtgctctag aa
<210>
       24
₹211>
       39
212>
      DNA
213> Artificial Sequence
☐
≶220>
$223> Synthetic DNA
<400>
       24
                                                                       39
agctttctag agcacggttc ataacagaag caacttcac
       25
<210>
<211>
      45
<212>
      DNA
<213> Artificial Sequence
<220>
<223>
      Synthetic DNA
<400> 25
aattctctag agaacgctca tgatgaatct gcttacctgg ataac
                                                                       45
```

```
26
<210>
<211> 50
<212> DNA
<213> Artificial Sequence
<220>
<223> Synthetic DNA
<400> 26
cttcttcagg ttatccaggt aagcagattc atcatgagcg ttctctagag
                                                                     50
₹210> 27
211>
      49
$212> DNA
213> Artificial Sequence
1220>
∭

≤223> Synthetic DNA
<400>
       27
                                                                     49
ctgaagaagg aactggctaa cggtaacgat gctctgcgta acgaagatg
<210> 28
<211>
      49
<212> DNA
<213> Artificial Sequence
<220>
<223> Synthetic DNA
<400> 28
```

gagaac	gagc atcttcgtta cgcagagcat cgttaccgtt agccagttc	49
<210>	29	
<211>	40	
<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	
<400>	29	
ctcatt	ctcc gttctactct gctctgcgta acactccgtc	40
2 10>	30	
2 11>	39	
2 12>	29 ctcc gttctactct gctctgcgta acactccgtc 30 39 DNA	
213>	Artificial Sequence	
<223>	Synthetic DNA	
< 400>	30	
ctttga	agga cggagtgtta cgcagagcag agtagaacg	39
<210>	31	
<211>	47	
<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	

cttcaa	aagaa cgtaacggtg gtaaccatga tccgtctcgt atgaaag	47
<210>	32	
<211>	47	
<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	
<400>	32	47
	32 cagct ttcatacgag acggatcatg gttaccaccg ttacgtt 33 45 DNA	• ,
之10>	33	
11>	45	
212>	DNA	
13>	Artificial Sequence	
\$220>		
<223>	Synthetic DNA	
<400> ctgtta	33 atcta ctctaaacat ttctggtctg gtcaggatag atcta	45
<210>	34	
<211>	41	
<212>	DNA	
<213>	Artificial Sequence	
<220>		

```
<223> Synthetic DNA
<400>
      34
                                                                     41
agcttagatc tatcctgacc agaccagaaa tgtttagagt a
<210> 35
<211> 42
<212> DNA
<213> Artificial Sequence
<220>
<223>
      Synthetic DNA
<4100> 35
aattcagatc ttcttctgct gataaacgta aatacggtga tc
                                                                     42
210> 36
₹211> 44
<212> DNA
$213> Artificial Sequence
<220>
<223> Synthetic DNA
<400>
      36
catccggatc accgtattta cgtttatcag cagaagaaga tctg
                                                                     44
<210> 37
<211> 48
<212> DNA
```

```
<220>
<223> Synthetic DNA
<400> 37
cggatgcatt ccgtccggct ccgggtactg gtctggtaga catgtctc
                                                                      48
<210>
       38
<211> 48
<212> DNA
<213> Artificial Sequence
<220>
<223> Synthetic DNA
<400>
       38
datcacgaga catgtctacc agaccagtac ccggagccgg acggaatg
                                                                      48
210> 39
211>
       35
<212> DNA
213> Artificial Sequence
<220>
<223> Synthetic DNA
<400>
       39
                                                                      35
gtgatcgtaa catcccgcgt tctccgactt ctccg
<210> 40
<211>
       36
<212> DNA
```

<220> <223> Synthetic DNA <400> 40 36 cttcacccgg agaagtcgga gaacgcggga tgttac <210> 41 <211> 40 <212> DNA <213> Artificial Sequence <220> Synthetic DNA <223> <400> 41 getgaagget tegttaactt egattaeggt tggtteggtg 40 <210> 42 40 DNA ⟨213> Artificial Sequence <220> <223> Synthetic DNA <400> 42 40 gtctgagcac cgaaccaacc gtaatcgaag ttaacgaagc <210> 43 <211> 44 <212> DNA

```
<220>
<223>
       Synthetic DNA
<400>
       43
                                                                          44
ctcagactga agctgatgct gataagactg tatggaccca tgga
<210>
       44
<211>
       41
<212>
       DNA
<213>
      Artificial Sequence
<223>
       Synthetic DNA
<400>
agcttccatg ggtccataca gtcttatcag catcagcttc a
                                                                          41
<210>
       45
<211>
       39
       DNA
<213>
       Artificial Sequence
<220>
<223>
       Synthetic DNA
<400>
       45
                                                                          39
aattcccatg gtaaccatta ccatgctccg aacggttct
<210>
       46
<211>
       42
```

<212>

DNA

<220> <223> Synthetic DNA <400> cacccagaga accgttcgga gcatggtaat ggttaccatg gg 42 <210> 47 <211> 41 <212> DNA <213> Artificial Sequence -[] -[] -(220> Synthetic DNA <400> 47 cigggtgcta tgcatgtata cgaatctaaa ttccgtaact g 41 <210> 48 <211> 42 <212> DNA <213> Artificial Sequence <220> <223> Synthetic DNA <400> cttcagacca gttacggaat ttagattcgt atacatgcat ag 42 <210> 49

<213>

<211> 37

Artificial Sequence

<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	
	49 aggt tactctgact tcgatcgtgg tgcttac	3
<210>	50	
<211>	37	
<212>	DNA	
13 3>	Artificial Sequence	
(2 23>	Synthetic DNA	
<100> gegataa 10 (200>	50 acgt aagcaccacg atcgaagtca gagtaac 51	31
< <u>2</u> 11>	38	
<212>	DNA	
<213>	Artificial Sequence	
<220>		
<223>	Synthetic DNA	
<400> attatca	51 acct teatteegaa atettggaae actgetee	38

<210>

```
<211>
                                                    38
  <212>
                                                   DNA
 <213> Artificial Sequence
  <220>
  <223>
                                                   Synthetic DNA
  <400>
                                                   52
 ctttgtccgg agcagtgttc caagatttcg gaatgaag
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           38
  <210>
                                                   53
  <211>
                                                   38
                                                   DNA
 Artificial Sequence
      Harris Constitution of the constitution of the
      IJ
       ij.
  <220>
 <223>
                                                   Synthetic DNA
 <400>
                                                   53
 ggacaaagtt aaacagggtt ggccgtaatg aaagctta
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           38
<210>
                                                   54
<211>
                                                 34
<212>
                                               DNA
 <213>
                                         Artificial Sequence
<220>
<223>
                                                   Synthetic DNA
<400>
                                                   54
```

agcttaagct ttcattacgg ccaaccctgt ttaa

```
<210>
       55
<211>
        20
<212>
       DNA
<213> Artificial Sequence
<220>
       Synthetic DNA
<223>
<400>
       55
ttttcccagt cacgacgttg
                                                                             20
<210>
       56
<211>
       21
(<u>1</u>12>
       DNA
 rj.
<213> Artificial Sequence
 H
 * # FEE
<220>
<223>
       Synthetic DNA
<400>
       56
caggaaacag ctatgaccat g
                                                                             21
<210>
       57
<211>
       36
<212>
       DNA
<213>
      Artificial Sequence
<220>
<223>
       Synthetic DNA
```

<400>

57

taaggaggtt taaaatgtct gacgatcgtg ttactc

<210> 58

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

TOROTHER INTEST

<223> Synthetic DNA

<400> 58

tacgccaagg ttgttaaccc a